



## GUIDELINES AND RESOURCES

### Interim Guidance for Autopsy and Safe Handling of Human Remains of Monkeypox Patients

The Centers for Disease Control and Prevention (CDC) is working with local and state health departments and public health laboratories to test specimens from humans and animals with suspect monkeypox infection. These interim recommendations provide guidance to autopsy personnel and morticians on the safe handling of human remains that may contain monkeypox virus.

All postmortem procedures require adherence to standard precautions with use of appropriate personal protective equipment (PPE) and facilities with appropriate safety features. Mechanical devices used during autopsies can efficiently generate fine aerosols that may contain infectious organisms. Thus, PPE should include both protective garments and respiratory protection as outlined below.

#### Smallpox vaccination

When possible, personnel with up-to-date smallpox vaccination (within 3 years) should participate in autopsy or mortuary care. If unvaccinated personnel must be utilized, persons without contraindications to vaccination are preferred. ([www.cdc.gov/ncidod/monkeypox/pdf/mphan.pdf](http://www.cdc.gov/ncidod/monkeypox/pdf/mphan.pdf))

#### Post-mortem preparation and transportation of human remains

Personnel who perform post-mortem care of the remains should wear PPE as recommended for Standard, Contact and Airborne precautions ([www.cdc.gov/ncidod/monkeypox/infectioncontrol.htm](http://www.cdc.gov/ncidod/monkeypox/infectioncontrol.htm)) The body should be prepared following routine healthcare facility procedures for cleaning and containing body fluids, then wrapped in a plastic shroud. Wrapping should be done in a manner that prevents contamination of the outside of the shroud; a change of gown and gloves may be necessary. If an autopsy will be performed, the shrouded body should be placed on a mortuary stretcher and covered with a clean linen sheet for transportation to the morgue. If the remains will go directly to a mortuary, it should be placed in a body bag prior to removal. Persons transporting prepared and covered human remains should wear gloves but other PPE is not required.

#### Personal protective equipment for autopsy personnel

Persons who transfer the remains from the mortuary stretcher onto the autopsy table should wear gowns and gloves. Personnel who perform or assist with the autopsy should wear the following PPE as required for Standard and Airborne Precautions in the autopsy setting.

- **Protective garments:** surgical scrub suit, surgical cap, impervious gown with full sleeve coverage, eye and face protection (e.g., face shield), shoe covers and double surgical gloves with an interposed layer of cut-proof synthetic mesh gloves.
- **Respiratory protection:** N-95 or N-100 respirators; or powered air-purifying respirators (PAPR) equipped with a high efficiency particulate air (HEPA) filter. PAPR is recommended for any procedures that result in mechanical generation of aerosols, e.g., use of oscillating saws. Autopsy personnel who cannot wear N-95 respirators because of facial hair or other fit-limitations should wear PAPRs.

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- **Handling of protective equipment:** protective outer garments must be removed when leaving the immediate autopsy area and discarded in appropriate laundry or waste receptacles, either in an antechamber to the autopsy suite or immediately inside the entrance if an antechamber is not available. Hands should be washed upon glove removal.

### Autopsy procedures

For autopsies and postmortem assessment of monkeypox cases, safety procedures should include:

- **Prevention of percutaneous injury:** all sharps should be carefully handled, including never recapping, bending or cutting needles, and ensuring that appropriate sharps containers are available.
- **Procedures:** The number and extent of procedures should be minimized, both to decrease opportunities for worker risk, and to decrease potential for environmental contamination. Perform autopsies only to the extent required to obtain needed information, omitting examinations that generate aerosols and increase the risk of environmental contamination, e.g., the use of oscillating saws to open the skull.

### Engineering strategies and facility design

- **Air handling systems:** autopsy suites must have adequate air-exchanges per hour and correct directionality and exhaust of airflow. Autopsy suites should have a minimum of 12 air-exchanges per hour and should be at a negative pressure relative to adjacent passageways and office spaces. Air should not be returned to the building interior, but should be exhausted outdoors, away from areas of human traffic or gathering spaces (e.g., off the roof) and away from other air intake systems. For autopsies, local airflow control (i.e., laminar flow systems), can be used to direct aerosols away from personnel; however, this safety feature does not remove the need for appropriate personal protective equipment.
- **Doors and windows:** During autopsy, keep doors and windows to autopsy suite closed.
- **Containment devices:** biosafety cabinets should be available for handling and examination of smaller specimens. Oscillating saws are available with vacuum shrouds to reduce the amount of particulate and droplet aerosols generated. These devices should be used whenever possible to decrease the risk of occupational exposure.

### Environmental cleaning

Minimize environmental contamination during the post-mortem procedure. Following the procedure, thoroughly clean and disinfect all surfaces with 0.5% sodium hypochlorite or other EPA-approved high level disinfectant. All reusable autopsy equipment should be cleaned and disinfected according to standard laboratory procedures.

### Autopsy specimens

All major organs should be sampled. Particular attention and extensive sampling should include tissues demonstrating gross pathology or involvement as suggested by clinical presentation. Autopsy specimens should include:

- Skin
- Spleen
- lymph nodes and tonsils
- liver
- lung
- kidney
- heart

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Place representative tissues in 10% buffered formalin for immunohistochemical or histopathologic evaluation and **keep** at room temperature.

Representative fragments of tissues listed above should be collected using sterile technique and placed in a sterile 1.5-2 mL screw-capped plastic vial with O-ring. **Do not add transport medium**. Refrigerate if shipment occurs within 24 hours; otherwise, freeze specimen.

Specimens should be labeled and packaged for transport as described in the specimen collection and transport guideline at ([www.cdc.gov/ncidod/monkeypox/pdf/specimenguide.pdf](http://www.cdc.gov/ncidod/monkeypox/pdf/specimenguide.pdf)).

After specimen collection, all **non-reusable** specimen collection and barrier protection materials should be placed biohazard bags for handling as medical waste

### Mortuary care

Mortuary care should be limited to necessary procedures following standard mortuary precautions.

- **Protective garments:** Impervious gown with full sleeve coverage, eye and face protection (e.g. surgical mask and face shield), shoe covers and double surgical gloves should be worn. An interposed layer of cut-proof synthetic mesh gloves should be considered for additional injury protection.
- **Prevention of percutaneous injury:** Use care when handling sharps to prevent blood or body fluid exposure. Needles should never be recapped, bent or cut. Sharps containers should be available.
- **Equipment and environmental decontamination:** Minimize environmental contamination during embalming. Following the procedure, thoroughly clean contaminated areas of the environment with 0.5% sodium hypochlorite or other EPA-approved high-level disinfectant. Reusable equipment used during embalming and other procedures for preparation of the body should be cleaned and disinfected.

### Questions

Pathologists and morticians may direct questions that related to this and other related CDC documents to the local or state health department or the CDC NCID Pathology Activity at 404-639-3133.

For more information, visit [www.cdc.gov/ncidod/monkeypox](http://www.cdc.gov/ncidod/monkeypox) or call the CDC public response hotline at (888) 246-2675 (English), (888) 246-2857 (Español), or (866) 874-2646 (TTY)